Этап № 4. На данном этапе необходимо выделить более конкретные цели, что обуславливает весомый вклад в успешную реализацию миссии компании в будущем.

Этап № 5. Выявление ключевых факторов успеха.

На этом этапе выделяются наиболее существенные с точки зрения миссии факторы достижения поставленных целей.

Этап № 6. Формирование сбалансированной системы взаимосвязанных показателей – критериев оценки эффективности развития морских терминалов на примере терминалов Ильичевского, Одесского, Южного морских торговых портов (ИМТП, ОМТП, ЮМТП).

Выводы

В данной статье в качестве подхода, систематизирующего критерии оценки эффективности развития морских терминалов, предлагается такой подход, как сбалансированная система показателей, которая в достаточной мере обоснованно позволяет увязать и согласовать миссию, цели и критерии оценки эффективности развития морского терминала, что и обуславливает ее объективную привлекательность.

Сбалансированную систему показателей представляется возможным представить в виде систематизированного профиля перспективного развития морского терминала (рис. 2), формирование которого осуществляется согласно предложенному алгоритму.

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A DICHOTOMY PROGRAMMING FOR MANAGING STRUCTURES OPTIMISATION

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Вивчено проблеми організації управління наукоємними виробничими системами, адаптованими до перетворення структури управління

Ключові слова: структура управління, програмування, задача про ранець

Исследованы проблемы управления наукоёмкими производственными системами, адаптированные к преобразованию структуры управления

Ключевые слова: структура управления, программирование, задача о ранце

The control problems of the science-intensive industrial systems adapted to control structure transformation are investigated

Keywords: control structure, programming, knapsack problem

Transformation of this country's economy affect also the managing system. Market relations demand to revise old concepts of management. At present it is necessary to apply new methods of analysis and a new management system for the enterprises.

Intensive development of management systems was aimed at management perfection. A new design object, an enterprise managing system, is a complicated social-economic system.

It requires existing methods and techniques, algorithms and procedures adaptation to the new conditions and complicated relations within the system and with the other systems.

The problem of optimum management structures development is especially topical now, after 2008th financial crisis whose consequence is felt up till now. This direction has a great potential for expenditures minimizing connected with production and realization, and risks of interest losing minimization in connection with incorrect managing decisions.

The paper aim. The paper aim is a knapsack problem adaptation to the managing structure optimization for science-intensive enterprises.

A knapsack problem solving as a theoretical basis for the optimum structure of an enterprise gaining

There are n objects and each of them is characterized by the weight αi and value Ci (it is supposed that both αi and Ci are integral positive numbers). There is also a knapsack having R volume. It is required that the knapsack be loaded with the objects in such a way that their summarized value would me maximum possible, but their weight would not exceed R. Let's denote $xi = 1$, if i-th object is put into the knapsack, but otherwise $xi = 0$.

Mathematical view of the problem is as follows:

$$f(x) = \sum c_j x_j \rightarrow \max;$$

$$\varphi(x) = \sum a_j x_j \leq R;$$

$$x_j \in \{0;1\},\ \ j = \overline{1,n}$$

A network structure of the problem representation is a tree, that's why a network, or dichotomic programming method gives an optimum solution.

The aim of dichotomic method with a knapsack problem is its application to the managing structure optimization for science-intensive enterprises, which is able to ensure the enterprise functioning under recurrent financial and economical crises and a steady rivalry on the gas turbine market. It also helps to ensure innovational development of an enterprise and its swift modernization. Computational complexity of the knapsack problem's algorithm can be estimated with the maximum quantity of matrix cells at the vertexes of network representation.

So, in the Fig. 1 an example of network representation is given for n=8 and b=12. At the network vertexes a maximum number of cells in a concrete matrix is shown. It is necessary to bear in mind that a maximum number of matrix cells at the utmost finite vertex is $b^2 = 144$ due to the problem derating. Maximum general number of cells is N = 192. In Fig. 2 there is another network representation of the same problem with maximum number of sells is N = 136.

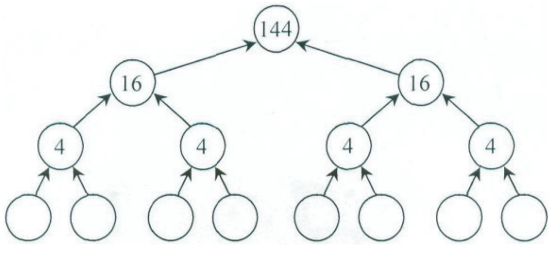

Fig. 1. Network representation (n = 8; b = 12)

A problem. Identify the network representation structure with minimum value of maximum total number of cells.

A theorem. If $2^{n-1} \leq b$, then an optimum structure is a tree of maximum symmetry.

The theorem proving. A tree of maximum symmetry can be got by sequential dividing of initial vertexes (starting with the finite vertex of the tree) into two equal parts n_1 and n_2 containing k vertexes each if $n = 2(k+1)$, or into two unequal parts $n_1 = k$ and $n_2 = (k+1)$, if $n = 2(k+1)$. Let the theorem be right for not more than n initial vertexes. We proved the theorem for $(n + 1)$ vertexes, when $n = 2k$ and $n_1 > n_2$ (Fig. 3).

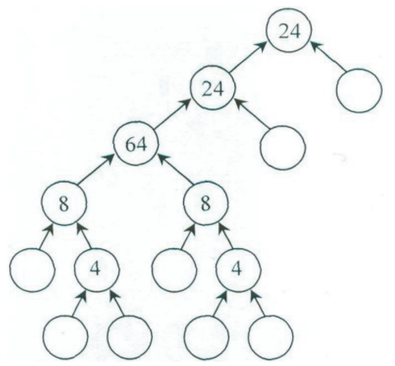

Fig. 2. Network representation (N = 192)

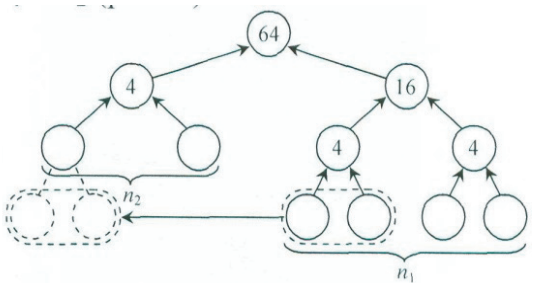

Fig. 3. A tree of maximum symmetry

As it is supposed, both parts should be of maximum symmetry. Let's transfer two initial vertexes from a sub-tree with bigger quantity of vertexes to one of initial vertexes of a sub-tree with lesser quantity of vertexes. Not complicated, but cumbersome computing shows that in the new structure a total quantity of cells diminishes.

Thus, initial structure in Fig. 3 had 92 cells, but a transformed one has just 88 cells. If $n = 2k+1$ we perform the same conversion (Fig. 4).

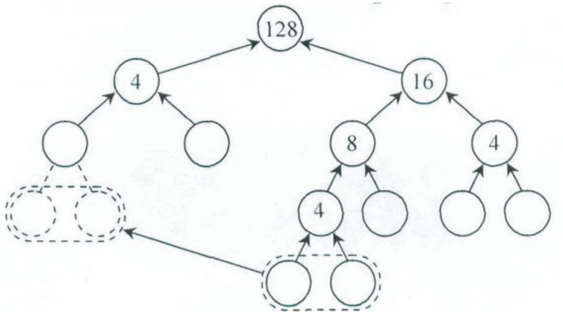

Fig. 4. A tree optimization due to quantity of cells diminishing

Thus, initial structure in Fig. 3 has 180 cells, and transformed one – just 164. Conducting such conversion we come to maximum symmetrical structure.

Proprietary model was developed at the Research and Production Complex (further - RPC) "Zorya"-"Mashproekt" (Nikolaev, Ukraine). It includes a batch production plant and an innovation centre, whose main task is scientific research and experimental design work, based on the project management principles. The enterprise is a typical science-intensive production system with closed cycle of production.

It is a complicated technical production and social system. The Complex has a closed cycle of gas turbine production and the necessary instruments and production equipment. It designs and turns out pilot models and batch products and also carries out after-sale service, repairing and spare parts delivery.

As a rule, research work is, though linear, but indirect function for the main aim – profit earning. At the innovation structure/centre (further, - IC) research and development become a linear production function whose fulfillment directly influences at the final financial results of the whole production system. That is necessary to take into account when detecting a type of reaction to the environmental changes, which is one of the fundamental principles of the IC organizational structure.

Along with the basic innovational activity in the IC there will be production and competitive activity as well as strategy planning. The base for all the measures is innovational strategy for the production system as the fullest and all-round plan of research work and adoption of innovations, adequately reflecting environment influence onto the innovation process and prognostic tendencies of changing.

When managing structure is optimized, the final stage will be the innovation and investment projects development resulting in further optimization of the structure on the base of precise information and mathematical calculation.

Conclusion

Science-intensive enterprise management structure optimization on the base of the knapsack problem within a dichotomic programming method is one of the most effective practical methods of the management structure improvement for an enterprise as a whole as well as for concrete departments and projects. The method allows to gain results with the least labour and material resources input.

The model, practically applied at the big science-intensive enterprise, demonstrated its effectiveness in the field of information and resource exchange between the departments of the Complex and it is the most optimum instrument of management for new products and services development.

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